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February 18, 2000

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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

Magalie Roman Salas
Secretary
Federal Communications Commission
445 12th Street, S.W., Room TW-AA325
Washington, DC 20554

Re: *Globalstar USA, Inc., Globalstar, L.P.,*
Ex Parte Submission, ET Docket No. 98-41

Dear Ms. Salas:

We are writing on behalf of Globalstar USA, Inc. and Globalstar, L.P. (collectively, "Globalstar") to follow up on certain issues raised in an *ex parte* meeting with members of the FCC staff that was held December 7, 1999.[1]

Currently pending before the Commission in ET Docket No. 98-41 is the proposal to allocate the 6700-7075 MHz band on a co-primary basis to feeder link earth stations operating in the non-geostationary orbit mobile satellite service ("NGSO MSS"). The proposal conforms the U.S. allocation to the global allocation for NGSO MSS feeder links adopted at WRC-95.

This letter follows up on two issues addressed in the December 7 *ex parte* meeting which relate to the pending allocation.

1. Although there is general agreement that NGSO MSS feeder link gateways operating at the proposed power flux density ("PFD") limits will not cause interference to co-

[1] *See ex parte* letter dated December 7, 1999, from Luisa L. Lancetti to Magalie Roman Salas, Secretary, FCC, enclosing written presentation materials and listing FCC personnel in attendance.

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primary *analog* fixed service (FS) or mobile operations, a few commenters claim that the proposed PFD limits will cause interference to *digital* FS or mobile operations. A question raised during the presentation was whether the ITU considered digital as well as analog FS and mobile operations in this band when it adopted the 7 GHz band allocation to NGSO MSS feeder links.

To respond to the latter issue, Globalstar attaches copies of pages from the Final Acts of the World Radio Communication Conference (WRC-95) and the 1995 Conference Preparatory Meeting (CPM) that demonstrate that both digital and analog operations of fixed services and broadcast auxiliary services *were* taken into account when the ITU allocated the 6700-7075 MHz band to NGSO MSS feeder links. (For reference purposes, Globalstar also attaches another copy of that portion of its December 7 *ex parte* presentation that explains that no harmful interference to digital FS operations will result from NGSO MSS feeder links.)

2. It is recognized that NGSO MSS feeder link gateways in the 6700-7075 MHz band may experience interference from *mobile* operations in the 7 GHz band, especially from airborne operations (feeder link gateways can avoid interference from or to *fixed* links through standard frequency coordination procedures). The 6875-7125 MHz band already is allocated on a primary basis to the broadcast auxiliary service ("BAS"), and some broadcasters use this band for mobile television pickup stations ("TVPUs") including airborne television pick-ups ("ATVPUs"). To resolve the potential for interference to NGSO MSS feeder link gateways from mobile TVPUs, the Society of Broadcast Engineers ("SBE") has proposed that existing and future mobile TVPUs, including ATVPUs having nationwide authorization, be given priority over all NGSO MSS earth stations and that "exclusion zones" be created whereby NGSO MSS gateways would be excluded for 100 km from the top 100 TV markets.

In the December 7 *ex parte* meeting, Globalstar explained how SBE's exclusion zone proposal is overly broad and harmful to MSS, an industry which the FCC has committed to foster. The SBE proposal would exclude MSS gateways from one-third to one-half of the land area of the continental U.S., regardless of whether any ATVPUs utilizing the 7 GHz band actually operate in these areas. Moreover, SBE's proposal to favor existing and all future ATVPUs, which operate intermittently and usually for only short periods, in all instances over NGSO MSS feeder link gateways, which continuously operate, would constitute an inefficient use of spectrum. Additionally, because the SBE exclusion zone proposal is not reciprocal it still would not protect NGSO MSS gateways from interference from "roving" ATVPUs with nationwide authorizations.

Globalstar encloses for Commission review a report prepared by Comsearch that supports an alternative to the exclusion zone approach proposed by SBE, an alternative that would minimize interference to NGSO MSS gateways from ATVPUs, while not curtailing existing ATVPU operations. Comsearch's findings include:

- The majority of ATVPUs actually operate in the 2 GHz band. The use of the 7 GHz band for airborne systems is not preferred because of the many fixed links in the band. Some markets, such as Washington, D.C. do not have significant ATVPU usage in any band.

- Most of the currently available TVPU equipment is frequency agile. For example, those ATVPUs operating in the 7 GHz band could switch to one of the two upper channels allocated to BAS (7075-7125 MHz), which are outside of the band proposed for NGSO MSS feeder links and, thus, should be able to operate without causing harmful interference to NGSO MSS feeder link gateways.

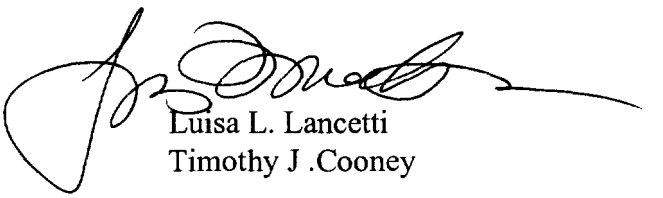
- In those areas where there already are significant 7 GHz ATVPU operations, the MSS feeder link gateways should be located at an appropriate separation distance, which will vary depending upon the terrain and other circumstances, but can range from 10 km to 100 km. In those areas where there is no current 7 GHz ATVPU usage, the feeder link gateway should be placed in an area coordinated with existing 7 GHz fixed links, and the constructed MSS gateway should be accorded first-in-time priority over new and roving ATVPUs utilizing the 7 GHz band.

- In order to provide protection to feeder link gateways, a bilateral coordination process must be instituted. The NGSO MSS licensees should participate in the local broadcasters' coordination meetings, and the local and national broadcasters should be required to exchange their relevant coordination data with the local NGSO MSS licensees before ATVPU operations in the 7 GHz band take place near constructed MSS feeder link gateways.

Comsearch's report also supports Globalstar's recommendation that the Commission establish first-in-time protection zones for co-primary 7 GHz users. NGSO MSS licensees should refrain from installing gateways in areas where interference from existing 7 GHz ATVPUs cannot be avoided. Once a site is selected and the MSS gateway built, however, the gateway requires protection from second-in-time or "roving" ATVPUs. Otherwise, NGSO MSS licensees would be improperly relegated to secondary status.

In accordance with Section 1.1206(b) of the Commission's rules, an original and one copy of this ex parte letter are submitted to the Secretary to be associated with the file in the above-captioned proceeding. Please call us if you have questions, or should you need additional information regarding this matter.

Sincerely,



Luisa L. Lancetti
Timothy J .Cooney

Attachments

cc: Julius Knapp w/attachments
Geri Matisse w/attachments
Tom Derenge w/attachments
Tom Mooring w/attachments
Howard Griboff w/attachments
Alexander Roytblat w/attachments
Michael Pollak w/attachments.

COMSEARCH

Leadership and Diversity for Wireless

COMSEARCH

Analysis of Globalstar Feederlink Earth Stations Sharing Spectrum with Airborne TV Pickups

Frequency Band: 6875-7075 MHz

Report Prepared for Globalstar USA
by
Comsearch

February 16, 2000

Contact: Ken G. Ryan/Joanna F. Nickerson
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0.0 Executive Summary

Globalstar USA has requested that Comsearch prepare a report to investigate the viability of spectrum sharing between non-geostationary Mobile Satellite Service (NGSO MSS) feederlink earth stations (FESs) and airborne television pickup (ATVPU) stations operating at 7 GHz in the United States. Comsearch utilized the Society of Broadcast Engineers (SBE) FCC filings and comments, existing FCC licenses, available technical literature, and information gathered from local broadcast engineers to determine a usage profile of airborne TV pickups. Comsearch also researched the licensing and coordination process for the Broadcast Auxiliary Services (BAS) airborne systems to determine how frequencies were allocated among the 7 GHz users.

While the usage study is by no means comprehensive, the results of this study indicate that the majority of ATVPU operations are in the 2 GHz band. Furthermore, in light of the limited current ATVPU usage of the 7 GHz band, the scope of the SBE's exclusion zone (100 kilometers from the top 100 TV markets) may not be consistent with the FCC policies favoring efficient use of the available spectrum. The SBE's proposed exclusion zones would preclude deployment of FES gateways in large areas of the United States. This preclusion would arise without any evidence that ATVPUs in those areas currently operate in the 7 GHz band, are proposed to operate in the 7 GHz band, or could not share 7 GHz frequencies with the FESs.

In our view, it would be more spectrally efficient if, instead of exclusion zones, coordination protocols would be established among 7 GHz users as an appropriate response to the interference concerns presented. In order to facilitate co-primary uses in the 7 GHz band, a separation distance between users may be required in certain instances, but these instances should be reciprocal and coordinated on a case-by-case basis. The extent of the separation distance can be determined by factors such as terrain, earth station discrimination angles, and other criteria.

1.0 Introduction

The Society of Broadcast Engineers (SBE), which represents BAS users in the 7 GHz band, has submitted comments on the FCC's Notice of Proposed Rulemaking in ET Docket No. 98-142 in which the SBE proposes policies that would restrict the operational flexibility and reliability of Mobile Satellite Service (MSS) operators. In particular, the SBE has petitioned the FCC to rule on the licensing of FESs in the presence of airborne TV pickups. A study examining the usage of ATVPUs in the band and approaches to coordination between them and FESs is therefore required. This study considers the dynamic geometry and operational characteristics of mobile TV pickup stations and provides a preliminary analysis of the potential impact of TV pickups on NGSO MSS feederlink earth stations.

Specifically, this report provides the following information:

- How ATVPUs are licensed.
- The number of ATVPUs licensed with nationwide or regional authorization.
- The allocated frequency bands.
- The spectrum allocation within each band.
- The current inter-system interference analysis process.
- The types of antennas and equipment used by ATVPUs.
- Flexibility in channel usage.
- Options to use frequency bands other than those allocated to MSS feederlink earth stations, (6700 – 7075 MHz).
- Link performance requirements.
- Interference criteria for feederlink earth stations.
- Calculation of separation distances between NGSO MSS Feederlink Earth Stations and ATVPUs in the 7 GHz band.

2.0 Analysis Results

One of the objectives of this study was to review the SBE comments and consider its proposal for a 100-kilometer exclusion zone around the major television markets. After researching the characteristics of ATVPUs and performing interference calculations, Comsearch has determined the following information and results.

- How ATVPUs are licensed.

  Typically, a broadcaster is granted a license to operate TV pickup equipment, which has been type-accepted by the FCC and FAA (for airborne use), by filing a FCC Form 313. These licenses can act as blanket authorization to operate a number of remote TV pickups, including ATVPUs. When additional TV pickup systems are developed they can also operate under the same original blanket license. Thus, the FCC records do not indicate precisely how many remote TV pickups are actually operating. The FCC does not assign specific frequency channels to a broadcaster and the broadcaster must instead contact the appropriate regional frequency coordinator to be assigned a TV pickup frequency channel and to coordinate use.

- The number of TV pickups licensed with nationwide or regional authorization.

  A query of the FCC Universal Licensing System (ULS) database showed 790 TV pickup licenses nationwide in the 6875 – 7075 MHz frequency range. Additional queries were done for other BAS frequency bands and the results are summarized below:

2 GHz:	1846 licenses
6.5 GHz:	78 licenses
13 GHz:	755 licenses
40 GHz:	17 licenses

  These licenses can act as a blanket authorization for a number of TV pickup systems, operating in any band allocated for TV pickups. The FCC has indicated that the number of licenses shown for TV pickups may be low by a factor of two or three. The number of ATVPUs is also not easily determined using the FCC ULS database. The FCC has not been very rigorous when it comes to requiring BAS licensees to update their remote TV pickup licenses. Nevertheless, the data indicates that it is reasonable to assume that there are over twice as many TV pickup licenses in the 2 GHz band as in the 7 GHz band. According to the SBE, TV pickups with nationwide operating authority do exist for TV Network and Cable Network entities, but we have not been able to confirm this. In summary, the available information on the population and frequency usage of ATVPUs does not support the SBE's proposal for widespread 7 GHz exclusion zones.

  The use of ATVPUs is prevalent in certain metropolitan areas such as Los Angeles or New

York, whereas Washington DC has only one station with a helicopter-based unit, and its usage is somewhat restricted because of flight zone restrictions. It should be noted that 7 GHz is also used for other airborne transmitters, such as blimps for sporting events.

It is important to note that the use of the 7 GHz band for airborne systems is not preferred because of the many fixed links (Studio Transmitter Links (STLs) and Inter-City Relays (ICRs)) in the band. The 2 GHz band is mainly used for remote, mobile, temporary, and airborne transmissions because of the favorable propagation characteristics and small number of fixed links in the band. Our limited survey of equipment manufacturers indicates that most ATVPUs use 2 GHz channels, rather than 7 GHz channels.

- The allocated frequency bands.

  TV pickups may operate in the 2, 6.5, 7, 13, and 40 GHz frequency bands.

- The spectrum allocation within each band.

2 GHz:	1990 – 2110 MHz	(Seven analog channels with 17-18 MHz bandwidth)
6.5 GHz:	6425 – 6525 MHz	(Four channels with 25 MHz bandwidth; Bandwidths of 1 MHz and 8 MHz are also allowed)
7 GHz:	6875 – 7125 MHz	(Ten channels with 25 MHz bandwidth)
13 GHz:	12.7 – 13.25 GHz	(Twenty-two channels with 25 MHz bandwidth)
40 GHz:	38.6 – 40 GHz	(Allocation on a secondary basis to fixed links with no channel boundaries specified)

- The current inter-system interference analysis process.

  Individual users of the 7 GHz band must coordinate amongst other in-band users to preclude interference. The current process is an ad hoc agreement on frequency allocations. The local broadcasters convene on a monthly, weekly, or as necessary basis, to discuss interference and coordination issues. Typically, a local broadcaster will be informally assigned a primary and backup channel in each band. As spectrum allows, network broadcasters may be assigned spectrum in a similar manner. In areas where many users exist the local broadcasters may be assigned to the 2 GHz band and the networks to the 7 GHz band. Attached in Appendix A is an example of the band allocation for the 2 and 7 GHz band for the Washington, DC area. As can be seen, the local entities are predominantly in the 2 GHz band and the networks in the 7 GHz band.

  Some of the operational scenarios for ATVPUs include using a signal tracking directional antenna, a geographical position tracking antenna, or a broadbeam antenna system. The first

such scenario may use the 7 GHz band for only one direction of the route; the ATVPU transmits to the fixed receiver and receives a tracking beacon signal in the 2 GHz band, or vice versa. There are not many tracking receiver sites because they require a gyroscopic tracking system, which is expensive to build. Also found in this band are tracking systems using Global Positioning System (GPS) based coordinates of the fixed receiver. Many ATVPUs communicate to established fixed receiver sites around a metropolitan area. In certain circumstances, though, it may be necessary to have an ATVPU transmit to another remote Electronic News Gathering (ENG) truck, which would be positioned in a convenient location.

- The types of antennas and equipment used by TV pickup stations.

  Comsearch's research into the types of antennas and equipment used by TV pickup stations yielded data from three manufacturers. This information can be found in Appendix B, which contains data downloaded from the Wescam, Adaptive Broadband (previously Microwave Radio Communications), and Global Microwave Systems web-sites.

- Flexibility in channel usage.

  As mentioned previously, most of the manufacturers that Comsearch contacted indicated that the majority of airborne systems are at 2 GHz, although some operate at 7 GHz. Most of the currently available equipment is frequency agile and can be easily changed to another in-band channel. If necessary, an ATVPU could switch to another transmit channel in the same band. For example, an ATVPU operating in the 7 GHz band could switch to one of the two upper 7 GHz channels (7075 – 7125 MHz) which are outside of the band proposed to be allocated for MSS feederlink operations. Switching to another band altogether would require significant modification to the airborne and fixed receive systems.

- Options to use frequency bands other than those allocated to MSS feederlink earth stations, (6700 – 7075 MHz).

  The two upper 7 GHz channels allocated to BAS (7075 – 7125 MHz) lie outside the band proposed for MSS feeder link operations. TV pickups can also be used in the 2, 6.5, 13, and 40 GHz bands. The 40 GHz band is currently not in use. The 13 GHz band has severe path length restrictions and is not commonly used for TV pickups; mostly it is used for "window shots" of very short length. Again, most TV pickups, including ATVPUs, prefer the 2 GHz band.

- Link performance requirements.

  Based upon existing usage in the 7 GHz band, typical ATVPU links require a carrier level between –40 dBm and –70 dBm. The calculations for interference into the FES's were performed using directional antennas (ITU-R F.699 and FCC Standard B) and omni-

directional antennas on the ATVPU station.

- Interference Criteria for feederlink earth stations.

  Long-Term: -153 dBW/MHz @ 20%
  Short-Term: -143 dBW/MHz @ 0.01%

  These levels are the maximum tolerable interference values for feederlink earth stations, when sharing with ATVPUs, when referenced at the receive antenna system output port.

- Calculation of separation distances between NGSO MSS Feederlink Earth Stations and ATVPUs in the 7 GHz band.

Background

A rough analysis was performed to examine separation distances allowing for successful uninterrupted operation of MSS Feederlink Earth Stations, operating their downlink receivers in the 7 GHz BAS band, in the presence of ATVPUs that are not required to coordinate. Although this study is not comprehensive, it does provide an indication of the interference potential to MSS gateways from ATVPUs. The calculations were performed utilizing typical operational parameters for the ATVPUs as determined from information gathered from equipment manufacturers, FCC licenses, and SBE engineers. Currently, all links considered in the analysis are analog FM–TV links. The parameters for the FES were taken from material provided by Globalstar USA.

Modeling Assumptions

The ATVPU parameters and FES parameters are summarized below.

ATVPU Parameters (can vary over a wide range):

Antenna Size:	1 to 2 m
Antenna Gain @ 7 GHz:	13.0 to >38.0 dB
Antenna Centerline:	100 to >1000 m
System Modulation:	Analog
Bandwidth:	25 MHz
Transmitter Output Power:	3 to 10 Watts
Feeder Loss:	5 to 10 dB
Antenna Sidelobe Characteristics:	ITU-R F.699 FCC Standard B Omni-directional

FES Parameters:

Antenna Size:	5.5 m
Antenna Gain @ 7 GHz:	50.2 dBi
½ Antenna Beam Width @ 3/15 dB points:	0.5°/0.99°
Antenna Centerline:	4.61 m
Antenna Sidelobe Characteristics:	$32 - 25\log(\Theta)$
Minimum Elevation Angle:	10°
Maximum Elevation Angle:	90°
System Receiver Frequency:	6925 MHz
Receive System Noise Temperature:	190°
Interference Threshold Long-Term:	-153.0 dBW/MHz
Interference Threshold Short-Term:	-143.0 dBW/MHz

The interference thresholds were calculated using the system noise temperature and were derived from ITU Recommendation SF.1006, Equation 3 for $P_1 = 20\%$ (Long-Term) and Equation 4 for $P_2 = 0.0025\%$ (Short-Term). The indicated thresholds are the maximum tolerable interference values for feederlink earth stations, when sharing with ATVPUs, when referenced at the receive antenna system output port.

Modeling Constraints

This analysis is a simplified approach to calculating separation zones. The operations of both the FES and ATVPU involve motion: the FES tracking the moving non-geostationary (NGSO) satellites and the ATVPU in motion over its area of operation. This motion leads to a time varying antenna gain. In order to take this phenomenon into account, the FES horizon gain for all azimuths has been determined by either Globalstar USA statistics based upon the horizon gain exceeded for 10 percent of the time or the Time Invariant Gain (TIG) method, whichever is more conservative. Both methods are described in ITU-R IS.849-1. Furthermore, in order to take the temporal and transitory nature of the ATVPU into account, the short-term interference objective has been used as the maximum permissible level of interference allowed. These two assumptions will accommodate the mobile and varying nature of these two services to some degree, and the analysis as a whole was made conservative due to the fact that worst case horizon gains and relative discrimination angles between the two services have been considered.

Calculation Approach

The calculation approach uses Comsearch's standard coordination procedures. All calculations considered a large range of parametric values so that the levels of the interference results can be evaluated with respect to the parameters.

Propagation Model Assumptions:

- Free space loss for line of sight conditions; modified as appropriate by over-the-horizon considerations for greater distances
- ATVPU antenna centerline height of 100 or 1000 meters above ground elevation of Gateway antennas
- Minimum separation distance of 1 kilometer
- Maximum separation distance of 100 kilometers
- Frequency of operation is 6925 MHz; Wavelength of 4.3 cm
- ATVPU transmitter output power of 3 watts
- Gateway antenna at minimum elevation angle
- No consideration given for terrain blockage

Calculation Results

For successful operation of FES gateways in the event that ATVPUs are not required to coordinate, the separation distances needed for various ATVPU antenna types at heights from 100 to 1000 meters range from 10 km to 100 km. These estimates include a 20 dB shielding factor when the ES elevation (off-pointing) discrimination angle is greater than 0 degrees (i.e. the ATVPU is at a position lower than the minimum elevation angle of 10 degrees). Examples of these calculations are summarized below.

Omni-directional (100 meter height)

Separation Distance (km)	**Required ATVPU-ES Azimuth Discrimination Angle** (No Shielding)	**Required ATVPU-ES Azimuth Discrimination Angle** (20 dB Shielding Factor)
1	Does not clear for any discrimination angle	Does not clear for any discrimination angle
10	Does not clear for any discrimination angle	Does not clear for any discrimination angle
25	Does not clear for any discrimination angle	Does not clear for any discrimination angle
50	Does not clear for any discrimination angle	Clears for all discrimination angles
100	Does not clear for any discrimination angle	Clears for all discrimination angles

These calculations indicate the separation distances needed for successful operation of FES gateways, in the event that ATVPUs are not required to coordinate, for omni-directional ATVPU antennas operating at a height of 100 meters. Included is a 20 dB shielding factor when the ES elevation (off-pointing) discrimination angle is greater than 0 degrees (i.e. the ATVPU is at a position lower than the minimum elevation angle of 10 degrees).

ITU-R F.699, 2-meter diameter (1000 meter height)

Separation Distance (km)	**Required ATVPU-ES Azimuth Discrimination Angle** (No Shielding)	**Required ATVPU-ES Azimuth Discrimination Angle** (20 dB Shielding Factor)
1	Does not clear for any discrimination angle	N/A
10	Does not clear for any discrimination angle	30 degree minimum discrimination angle
25	Does not clear for any discrimination angle	15 degree minimum discrimination angle
50	40 degree minimum discrimination angle	10 degree minimum discrimination angle
100	30 degree minimum discrimination angle	5 degree minimum discrimination angle

These calculations indicate the separation distances and orientation discrimination angles needed for successful operation of FES gateways, in the event that ATVPUs are not required to coordinate, for 2-meter diameter directional ATVPU antennas operating at a height of 1000 meters. Included is a 20 dB shielding factor when the ES elevation (off-pointing) discrimination angle is greater than 0 degrees (i.e. the ATVPU is at a position lower than the minimum elevation angle of 10 degrees).

3.0 Summary and Conclusions

- If ATVPUs are not required to coordinate to avoid the frequencies utilized by 7 GHz FES gateways, our findings indicate that a reciprocal separation distance (between ATVPUs and a FES) of as much as 100 km may be justified under certain circumstances. The data surveyed, however, does not seem to justify the SBE recommendation for 100 kilometer exclusion zones around the top 100 markets because the deployment of ATVPUs at 7 GHz does not seem to be very prevalent at this time. Moreover, the relatively few ATVPUs that operate in the 7 GHz band have the ability to switch to the two upper channels (7075 – 7125 MHz) which lie outside the band proposed for allocation to MSS feederlink earth stations. The main band for ATVPUs is 2 GHz for most markets. Some markets, such as Washington, DC, do not have significant ATVPU usage in any band.

- In order to provide protection to the FES, a bilateral coordination process must be instituted. This process would ensure the successful operation of a licensed FES facility and allow for the BAS community to continue to add fixed links in the 7 GHz band. An effective sharing scenario would be to have the MSS licensee work with the local broadcast community in the area(s) where the FES is to be licensed and to determine if interference from ATVPUs will be a significant problem. In those areas where there is already significant 7 GHz ATVPU usage, the FES should be located at an appropriate separation distance. In those areas where there is no 7 GHz usage, the FES should be placed in an area free from interference from existing fixed links and should be accorded first-in-time priority over ATVPUs utilizing the 7 GHz band. The BAS community should ensure long-term protection for the FES by avoiding the 7 GHz band for ATVPUs in the proximity of this FES.

- In those instances where ATVPUs may be required in an area near an installed FES, an interference analysis and coordination process should be followed to exchange technical data and assure both parties that the operation of the ATVPU will not cause interference. Since the number of FES facilities is limited, it is recommended that the MSS licensee participate in the local SBE coordination meetings and that the local broadcasters be required to exchange their relevant coordination data with any local MSS licensee.

Appendix A

Channel Plan for Washington, DC

Washington Area

W.E.B.E. Broadcast Microwave Frequency Coordination

Effective date: May 1, 1988

2Ghz Prevailing Pattern of Use

Ch 1	*WRC*	/	(NBC)
Ch 2	*WUSA*	/	(CBS)
Ch 3	*WJLA*	/	(ABC)
Ch 4	*WTTG*	/	(Fox), (C-Span)
Ch 5	*CNN*	/	(Gannett), (WUSA)
Ch 6	(NBC),		thers)
Ch 7	(CBS) (Gannett) (CN[illegible]G) (WNVC-RPU) (Others)		

7Ghz Prevailing Pattern of Use

Ch 1	------ ICR USE ------		
Ch 2	*NBC*	/	(WRC)
Ch 3	*CBS*	/	(WUSA)
Ch 4	*Group W*	/	(H.T.S)
Ch 5	(WUSA)	/	(Others)
Ch 6	(WRC)	/	(Others)
Ch 7	*ABC*	/	(WJLA)
Ch 8	*Gannett*	/	(WTTG)
Ch 9	(WJLA)	/	(Others)
Ch 10	------ ICR USE ------		

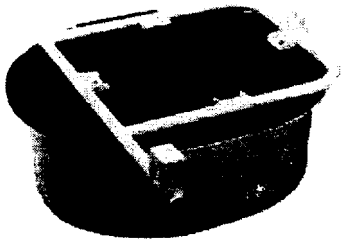
* INDICATES PRIMARY USER ON THAT CHANNEL. ( ) INDICATES SECONDARY USER. No organization "owns" a channel outright. No Organization has more than one primary channel.

Appendix B

Manufacturer Information

Skypod V

- **Externally mounted antenna pod**
- **Universal installation interface**
- **Fully integrated Microwave transmitter & receiver**
- **Three antennas (highgain, downlink, OMNI)**
- **Optimum signal quality**
- **Easy to use**



The SKYPOD V™ airborne microwave system is the next generation of long range airborne video microwave transmission and relay systems from Wescam, providing reliable, continuous, high quality video and audio signals in real time to fixed or mobile ground receive sites. The system includes an externally mounted antenna pod integrated with its own microwave transmitter, receiver, channel filter and up to three separate antennas: an autotracking directional high gain antenna (using GPS and aircraft heading sensors for tracking control), an omnidirectional antenna and a downlooking antenna. This configuration provides maximum operational flexibility while still maintaining optimum signal quality for superior im transmission. Antenna selection is performed remotely from the operat aircraft. Each antenna can be configured for simplex or duplex operation to also be operated as an airborne microwave repeater.

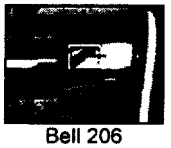
Profile

Typical Applications (click to view)

Electronic News Gathering

Command & Control

Typical Installations (click to view)



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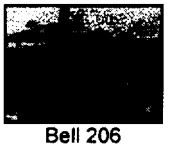

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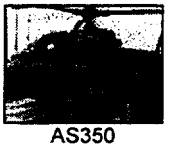

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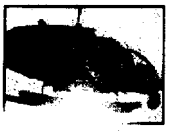
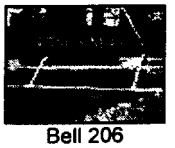
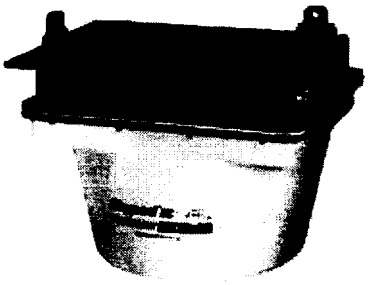




Bell 206

Skypod LC



- **Externally mounted antenna pod**
- **Universal installation interface**
- **Fully integrated Microwave transmitter**
- **Single directional antenna (high gain)**
- **Optimum signal quality**
- **Easy to use**

The Skypod-LC is an airborne microwave video transmission system designed for applications where the performance and range of a tracking, high gain, directional antenna is needed but size, weight, or budget allowances do not permit the installation of a Skypod V system. Ideally configured for law enforcement applications, it is equally suited to broadcast systems not requiring the full range or airborne repeater capabilities of a Skypod V. The system includes an externally mounted antenna pod integrated with its own microwave transmitter, and a single, directional high gain antenna. The system uses GPS and aircraft heading sensors for tracking control. Navtrack is optional.

Profile

Typical Applications (click to view)


Airborne Law Enforcement


Electronic News Gathering


Command & Control

Typical Installations (click to view)

System Configuration

Coming Soon

To request detailed product specifications click here...

OMN-ADU

- **Deployable Antenna**
- **Rugged, Lightweight**
- **Integrated Transmitter**
- **Failsafe features**
- **Easy operation**
- **SmartLink Interface**

The OMN-ADU Airborne Microwave System is a low cost, rugged, lightweight microwave transmission system for reliable, continuous, high quality video and audio signals from airborne cameras. The system includes an externally mounted pod with an omni-directional antenna mounted at the end of a deployment arm mechanism. The microwave transmitter is integrated into the pod to minimize signal losses and to allow the option of having several OMN-ADU pods covering different frequency bands that can be quickly installed as required. A wide range of frequency and power options is available. Also included are such fail-safe features as a breakaway link in the deployment arm, redundant deploy and stow indicators, automatic self test and auto-stow on failure detection.

This system is readily upgraded to include the NavTrack option, which transmits aircraft position to NavTrack equipped autotracking receive antennas. Upgrading to the longer range Skypod V and Skypod LC is also easy, since the cable, connector and controls are standard for all Wescam antenna pods.

Profiles

Typical Applications (click to view)

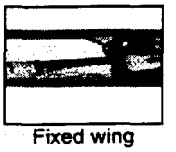
Electronic News Gathering

Command & Control

Typical Installations (click to view)

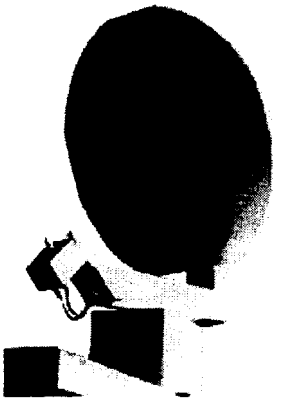
Bell 412

Bell 412



Fixed wing

PRO-300



- **Long Range Microwave Receive System**
- **Single or Multiple Radio Frequency Bands**
- **High Quality Video, Audio**
- **NavTrack™ AutoTracking Antenna**
- **Local, Remote, and Networked Control Systems**
- **TouchStar™ Graphic Interface**

In use by most of the biggest names in broadcasting in the U.S. and abroad, the PRO-300 has become the industry standard in long range, microwave receive systems for reliable, continuous, high quality reception of video and audio transmissions. The antenna is typically installed on a tower or rooftop at a location selected for best continuous line-of-sight coverage to the potential transmitting sites (terrestrial and / or airborne). The equipment rack containing the microwave receiver and controller can be located up to 1,500 feet away, and the control location can be situated just about anywhere to which video, audio and data links can be established.

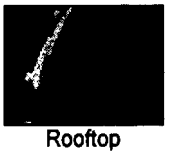
The system components are all 19-inch rack mounted units. They include a microwave receiver, a Slave Controller (the TS-940SL), which interfaces with the antenna and the microwave receiver. A TouchStar Master Controller is the primary operator interface for antenna, receiver and tracking control, and is included as necessary. (TouchStar systems can control more than one receive site. It is not necessary, therefore, to purchase one for every remote) Other typical options include a color video monitor, and VTR.

Related TouchStar options now available include integrated searchable maps (dependant on location), networked Master Controllers, on screen Real Time Video window, remote access modems enabling a remote diagnostics capability, integrated single or multiple ground camera control, and remote switcher control.

Profile

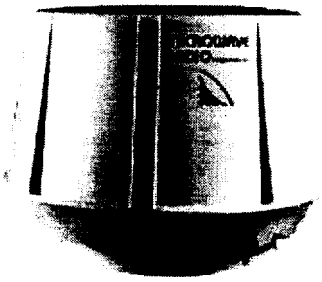

Electronic News Gathering


Command & Control


Rooftop


Rooftop with relay

ULT-160



- **Medium Range Microwave Receive System**
- **Single or Multiple Radio Frequency Bands**
- **High Quality Video, Audio**
- **NavTrack™ Antenna Steering**
- **Local, Remote, and Networked Control Systems**
- **TouchStar™ Graphic Interface**
- **Low wind loading**

In use by most of the biggest names in broadcasting in the U.S. and abroad, the ULT-160 has become the industry standard in medium range, microwave receive systems for reliable, continuous, high quality reception of video and audio transmissions. The antenna is typically installed on a tower or rooftop at a location selected for best continuous line-of-sight coverage to the potential transmitting sites (terrestrial and / or airborne). The equipment rack containing the microwave receiver and controller can be located up to 1,500 feet away, and the control location can be situated just about anywhere to which video, audio and data links can be established.

The system components are all 19-inch rack mounted units. They include a microwave receiver, a Slave Controller (the TS-940SL), which interfaces with the antenna and the microwave receiver. A TouchStar Master Controller is the primary operator interface for antenna, receiver and tracking control, and is included as necessary. (TouchStar systems can control more than one receive site. It is not necessary, therefore, to purchase one for every remote) Other typical options include a color video monitor, and VTR.

Related TouchStar options now available include integrated searchable maps (dependent on location), networked Master Controllers, on screen Real Time Video window, remote access modems enabling a remote diagnostics capability, integrated single or multiple ground camera control, and remote switcher control.

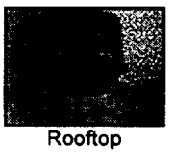
Profile

Typical Applications (click to view)

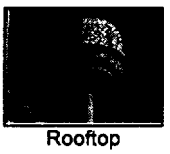
Electronic News Gathering

Command & Control

Typical Installations (click to view)



Rooftop



Rooftop